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TITLE: METHOD AND APPARATUS FOR WASHING
INTERIOR OF PIPE

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INVENTOR-INFORMATION:

NAME

TAKANASHI, KOICHI

NISHIO, SHIGEFUMI

ASSIGNEE-INFORMATION:

NAME

INNOV CENTER KK

COUNTRY

N/A

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ABSTRACT:

PURPOSE: To wash the interior of piping without damaging the piping and generating the clogging of the piping with ice by injecting an icelike substance.

CONSTITUTION: Waterdrops are blown off by compressed air and the scattered waterdrops are formed into ice particles by adiabatic expansion and these ice particles are injected in a pipe to wash the interior of the pipe or waterdrops are injected in the pipe to be washed under vacuum to be

*ice + droplets
H₂O & nozzle.*

formed into ice
particles by mass transfer and these ice particles are
allowed to impinge
against the inner surface of the pipe to be washed to wash
the interior of the
pipe. A pipe interior washing device is constituted by
providing a head 8
having small holes 5 emitting waterdrops 4 and nozzles 6
injecting compressed
air to the leading end part of the pipe 3 inserted in the
pipe to be washed so
as to produce and inject ice in the vicinity of the head.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is [0002] about washing inside piping.

[Description of the Prior Art] The approach of injecting an approach, ice, or water using a chemical and an abrasive material as a conventional washing technique, the approach with a brush, etc. are learned.

[0003]

[The technical problem which invention makes solution *****] perfect removal of the foreign matter with risk of damaging piping used for washing is difficult for the above-mentioned conventional technique -- etc. -- there was a fault. Moreover, if it was in the approach of injecting or sending ice from the edge of tubing, there was a failure with which ice is got blocked in the middle of tubing with the configuration of a tube diameter or tubing. Moreover, when maintaining an icy degree of hardness, washing of a part far from an injection location was difficult for the approach of mixing with a liquid or a gas, and ice and injecting them because of re-freezing generated between ice.

[0004]

[Means for Solving the Problem] The washing approach using ice is adopted and risk of damaging piping can be avoided by adjusting icy hardness and jet velocity with an object. Moreover, in order lose the deflection of the washing effectiveness in tubing and to prevent ice plugging in washed tubing, this invention formed the ice-like matter in the location for washing of piping which should be washed, depended on colliding or contacting this ice-like matter to a washed field, washed the interior of piping, and made it the means of technical-problem solution to prevent icy plugging by ****(ing) water and a gas.

[0005]

[Example 1] Drawing 1 is explained. The washing head 8 is inserted in the location where the squeezing gas spouted in the washed field 7 inside the piping 1 which should be washed hits. This washing head 8 is connected with the body 2 of a washing station by the flexibility tubing 3, and the washing head 8 is equipped with a pinhole 5 and the squeezing degassing nozzle 6 for water to ****. Furthermore, the flexibility tubing 3 contains the tubing 10 for sending tubing 9 and the squeezing gas for sending water to the washing head 8 from the body 2 of a washing station. Moreover, the body 2 of a washing station is equipped with the water delivery pump, the air compressor, and the air cooler.

[0006] the water sent through tubing 9 -- the 0.0011./s drop from the pinhole 5 of the washing head 8 -- the gas squeezed and cooled in 100 atmospheric pressures which are made to come out and are further sent through tubing 10 -- 0.51./s -- it comes out comparatively and emits from the squeezing degassing nozzle 6 of the washing head 8.

[0007] It is blown away by the squeezing gas, and ice-izes by adiabatic expansion, and the washed field 7 is collided or contacted, and it is failed to shave dirt and the adhesion deposit of the washed field 7, it mixes, and the waterdrop 4 which **** from a pinhole 5 is *****. If the include angle of the jet hole of a squeezing gas is aslant set to the circumferencial direction of this tubing from the location from which it separated from the core of the flexibility tubing 3, the washing head 8 rotates and ice can be injected

spirally. The equipment which sends the flexibility tubing 3 automatically may be used so that the washing head 8 may move at uniform velocity in the interior of the tubing 1 for washing. By changing the waterdrop injection quantity, or the gaseous rate of squeezing and a gaseous cooling rate, an icy degree of hardness or particle size can be adjusted.

[0008]

[Example 2] Drawing 2 is explained. The both ends of the piping 1 which should be washed are sealed with a lid 11, and vacuum suction is performed until the interior of piping which should be washed via the pneumatic tube 13 with a vacuum pump 12 reaches 1/2 toll. Depending on leading the waterdrop injection pipe 14 inserted in the interior of the piping 1 which should be washed, and making waterdrop 4 0.01l./s inject or **** from a pinhole 5 to the washed field 7 with the water feed gear 15, this waterdrop 4 is ice-ized according to mass transfer, changes to the snow of the shape of granular ice or granulated sugar, collides or contacts the washed field 7, and excepts dirt and a deposit from the washed field 7. On the occasion of sealing of the piping 1 which should be washed, the sealing location is not restricted to both ends, but can also be made movable. By changing the waterdrop injection quantity or the rate of a vacuum, an icy degree of hardness or particle size can also be adjusted.

[0009]

[Effect of the Invention] Since an icy degree of hardness and particle size can be adjusted, there is no risk of damaging tubing like the approach using sand or high-pressure water, and it can mix better [dirt or an adhesion deposit] than the case where water is used, and can discharge efficiently. Furthermore, safety is high, there is versatility and it is more nearly usable than the approach using sand, an abrasive material, and a chemical also for piping for potable water. Use becomes possible by raising the purity of the water to be used in special plants, such as chemistry and atomic energy, etc.

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CLAIMS

[Claim(s)]

[Claim 1] The washing approach inside tubing characterized by using as snow of the shape of the granular ice which is made to ice-ize this waterdrop by adiabatic expansion, and injects it by blowing away the waterdrop made to inject or **** in tubing by emission of a squeezing gas in the approach of washing the interior of tubing using ice, or granulated sugar [claim 2] The washing approach inside tubing characterized by to perform vacuum suction in this tubing, to depend on making waterdrop inject or **** to this tubing endothecium washing side, to make this waterdrop ice-ize according to mass transfer in the approach of washing the interior of tubing using ice, to make it change to the snow of the shape of granular ice or granulated sugar, and to make this granular ice or granulated sugar-like snow contact or collide with a washed field.

[Claim 3] The interior washing station of tubing characterized by being in the equipment which injects ice and washes the interior of tubing, having the washing head which has the pinhole which waterdrop is made to inject or ****, and the nozzle which makes a squeezing gas blow off in the point of tubing inserted into washed tubing, and this insertion tubing, and carrying out manufacture injection of the ice near [this] a washing head.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view about claims 1 and 3 and an example 1.

[Drawing 2] The sectional view about a claim 2 and an example 2.

[Description of Notations]

1. Piping Which Should be Washed
2. Body of Washing Station
3. Flexibility Tubing
4. Waterdrop
5. Pinhole
6. Squeezing Degassing Nozzle
7. Washed Field
8. Washing Head
9. Tubing
10. Tubing
11. Lid
12. Vacuum Pump
13. Pneumatic Tube
14. Waterdrop Injection Pipe
15. Water Feed Gear

[Translation done.]